



Fungal Degradation of Chemical Warfare Agents ...

... Applied to the Abandoned Chemical Weapons (ACW) in Chinaan update

<http://www.botany.hawaii.edu/faculty/wong/Bot201/Basidiomycota/Basidiomycetes.htm>



During the last World War, Japan abandoned in China many chemical weapons. The Japanese Government has taken responsibility of cleaning up/destroying these Abandoned Chemical Weapons (ACW). In 1999, an ACW Office was established, within the Japanese Minister's Office, to implement the destruction of the ACW's in China (see illustrations below). For more information please click: http://www.arofe.army.mil/NEWS%20from%20ARO-FE/NEWS_Jan01.pdf. The 2nd Symposium on Abandoned Chemical Weapons (ACW) Demilitarization was held on January 28, 2002, at Science Council of Japan, Tokyo, Japan (see report of this conference below).

The following topic presents an interesting work by Associate Professor Hiroyuki Wariishi of Kyushu University described in the Magazine on Bioscience and Industry vol. 60 No.4 247(2002) Professor Wariishi has been studying the characteristics of a large class of higher fungi called basidiomycetes. Click URL address under Bulletin's Title. The basidiomycetes are unilaterally responsible for decomposing lignin, a naturally occurring aromatic polymer found in the plant cell walls. Lignin degrading fungi are also capable of degrading a wide variety of aromatic pollutants such as dioxins and biphenyls. Figure 1 shows the metabolic pathways involved in fungal degradation of Yperite*. In fungal culture, Yperite is non-enzymatically hydrolyzed to thiodiglycol via half-yperite. Thiodiglycol is effectively decomposed to ethyleneglycol and mercaptoethanol with a cleavage of sulfide bond by fungi. (Path A) The other minor pathways are also suggested (Path B and the route to S-oxide and -dioxide formation). The culture media containing only thiodiglycol or ethyleneglycol as a carbon source were utilized and mycelium dry weight was monitored, indicating that fungi could grow either in thiodiglycol or in ethyleneglycol media at a rate much slower than a complete culture media. This result combined with the fact that thiodiglycol can act as a sulfur source strongly suggests that Yperite is completely mineralized by basidiomycetes and that only the chloride ion is released to the environment when Yperite is treated by basidiomycetes. The abstract of this work can be found in vol.24 No.6 of URL address: <http://kluweronline.com/issn/0141-5492>. A description of the Fungi used in the experiments can be accessed by clicking the URL address provided below. * Since the Chemical Weapons Convention prohibits the production of Yperite, special permission was granted by the Japanese Government to synthesize this compound.

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SUPPORT

- Conferences
- Workshops
- Exchange Visits
- Research Proposals

LATEST ITEMS

- ARO-FE Topics
- Reports
- Tech Briefs
- NSF S&T Highlights

CONFERENCES

Upcoming:

- International
- Domestic(Japan)
- Recent Abstracts

QUARTERLY
REPORTS

ONE PAGE
REPORTS

ARO 2001 REVIEW

ARCHIVES

CONTACT
INFORMATION

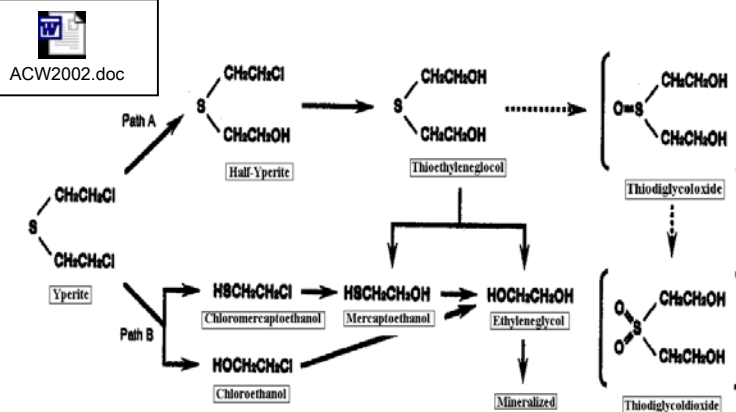


Figure 1. Decomposition of Yperite by Basidiomycetes

The Break Line is only observed by the secondary metabolism of Fungal

<http://www.sph.uth.tmc.edu/utcam/summary/coriolus.htm>



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